§1.3 - Rates & Proportions

① Convert 22 miles in 30 minutes to miles per hour.

$$\frac{22 \text{ miles}}{30 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}}$$

* trying to cancel minutes so they go opposite (on top of new ratio).
* 60 min = 1 hr

$$\frac{22 \times 60 \text{ mi}}{30 \times 1 \text{ hr}} = \frac{1320 \text{ mi}}{30 \text{ hr}} = \boxed{\frac{44 \text{ mi}}{1 \text{ hr}}}$$

② Convert 300 yd in 30 sec to miles per hour.

$$\frac{300 \text{ yd}}{30 \text{ sec}} \times \frac{3600 \text{ sec}}{1 \text{ hr}}$$

* trying to cancel sec so they go on top.
3600 sec = 1 hr

$$\frac{300 \times 3600 \text{ yd}}{30 \times 1 \text{ hr}} = \frac{1,080,000}{30} = \frac{36,000 \text{ yd}}{1 \text{ hr}}$$

$$\frac{36,000 \text{ yd}}{1 \text{ hr}} \times \frac{1 \text{ mi}}{1760 \text{ yd}}$$

* trying to cancel yards so they go in the bottom
1760 yd = 1 mi

$$\frac{36,000 \times 1 \text{ mi}}{1 \times 1760 \text{ hr}} = \frac{36,000 \text{ mi}}{1760 \text{ hr}} = \boxed{\frac{20.45 \text{ mi}}{1 \text{ hr}}}$$

§1.5 - Using Proportions to Solve problems

(1) $\frac{24 \text{ tagged}}{8 \text{ observed}} = \frac{P \text{ tagged}}{80 \text{ observed}}$

$8 \cdot p = 24 \cdot 80$

Cross-multiply

$\frac{a}{b} \times \frac{c}{d}$

$\frac{8p}{8} = \frac{1920}{8}$

multiply

solve by dividing

$p = 240$ tagged

(2) $\frac{3 \text{ bars}}{420 \text{ Calorise}} = \frac{x \text{ bars}}{140 \text{ Calories}}$

$420 \cdot x = 3 \cdot 140$

cross multiply

$\frac{420x}{420} = \frac{420}{420}$

multiply

Solve by dividing

$x = 1$ bar

£1.5

(3) 8 correct : 15 questions = 24 correct : Q questions

$$\frac{8 \text{ correct}}{15 \text{ questions}} = \frac{24 \text{ correct}}{Q \text{ questions}}$$

$8 \cdot Q = 15 \cdot 24$ Cross multiply

$\frac{8Q}{8} = \frac{360}{8}$ multiply

$Q = 45$ questions divide to solve

(4) $\frac{d \text{ dollars}}{5 \text{ miles}} = \frac{\$9}{7.5 \text{ miles}}$

$7.5 \cdot d = 5 \cdot 9$ Cross multiply

$\frac{7.5d}{7.5} = \frac{45}{7.5}$ multiply

$d = \$6$ divide to solve